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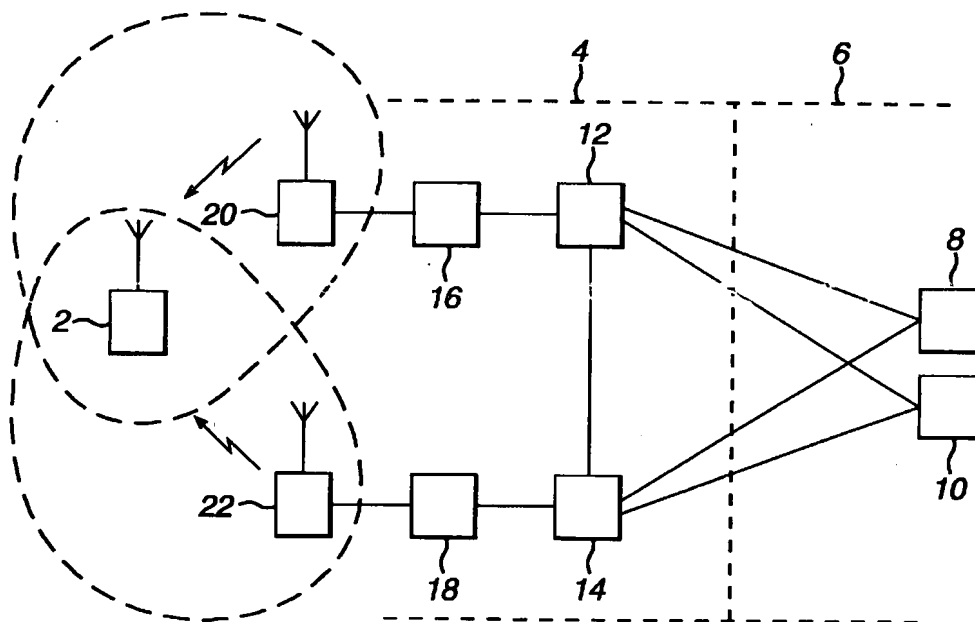
(54) Prioritizing paging messages in a radio network controller

(57) A radio network controller (RNC) (12) acting as a servicing RNC (12) selectively directs paging messages to a drift RNC (14) when a mobile phone is so located that it can communicate with both.

The servicing RNC (12) includes a paging header

generator (32) which adds to the paging message a header indicative of the type or priority of the paging message. The drift RNC (14) employs a paging header reader (36A) to read the header so that the paging messages received can be properly prioritized or scheduled.

FIG. 1



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Description

[0001] The present invention relates to radio network controllers (RNCs) and, in particular, but not exclusively, to RNCs used in third generation (G3) for example universal mobile telecommunications systems (UMTS).

[0002] In a mobile telephone network, a mobile station (UE) will move from one cell zone to another. Since adjacent cell zones overlap, the mobile phone will at times be located simultaneously in two cell zones. Each cell zone has its own transmitter/receiver connected to a node B which in turn is connected to a corresponding RNC. The RNCs of adjacent zones are linked. Each RNC is connected to a mobile switching centre (MSC) and/or servicing GPRS (general packet radio system) support node (SGSN) within a core network.

[0003] When a mobile phone or unit is located wholly in one zone, its corresponding RNC will control the mobile unit and continue to control the mobile unit during its transition from one cell zone to another through an overlap between two cell zones via a corresponding node B and at an appropriate point will hand over control of the mobile phone to the RNC corresponding to the new cell zone.

[0004] During this period, the controlling RNC may also be known as the servicing RNC and the RNC in the adjacent zone is known as the drift RNC.

[0005] The servicing RNC will receive and transmit signals from and to the mobile phone unit directly through its corresponding node B or through the drift RNC and will communicate with the mobile phone either through its corresponding node B or through the drift RNC and its corresponding node B depending upon pre-programmed criteria such as a signal strength and/or error rate change from one route to the other as the situation varies.

[0006] The servicing RNC also carries out the function of paging the mobile phone.

[0007] There are generally three main reasons for paging the mobile phone, namely:

- (1) core network initiated paging;
- (2) signalling related paging; and
- (3) packet related paging.

[0008] With core networks initiated paging, the servicing RNC deconstructs the paging message and reconstructs it for onward transmission to the mobile phone.

[0009] With signalling related paging, the servicing RNC responds to a transmission from the MSC to construct its own signal related paging message, while with packet related paging, the servicing RNC responds to a transmission from the MSC to construct its own signal related paging message.

[0010] Because the servicing RNC constructs all three types of paging messages, it knows the importance of each and so can be programmed to prioritize the paging messages in a particular order. However,

once these paging messages are forwarded to the drift RNC, the drift RNC cannot prioritize between at least the signal related paging message and the packet related paging message since it was not party to the construction process.

[0011] It is an object of the invention to provide an improved RNC.

[0012] According to the invention there is provided a radio network controller (RNC) for a third generation (G3) telecommunication network comprising a paging message construction unit which when the RNC acts as a servicing RNC acts to construct or reconstruct paging messages in response to paging signals or data received at a first input from a core network, means for scheduling or prioritizing the paging messages received from the construction unit and supplying them to a buffer unit for onward transmission to a first output in the scheduled or prioritised order, characterised by paging header generator means for supplying a header to the paging messages constructed by the paging message construction unit indicative of the type or priority of the accompanying paging message and feeding it to a second output for onward transmission to a drift RNC, and reading means operative when the RNC acts as a drift RNC to respond to signals received at a second input from a servicing RNC to read the headers of the paging messages and to direct the accompanying paging message to the buffer unit for onward transmission to the first output in the prioritized or scheduled order.

[0013] A radio network controller embodying the present invention, will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of part of a mobile unit system; and

Figure 2 is a block diagram of one of the two RNCs used in the system of Figure 1; the other being similar.

[0014] The mobile telephone system shown in Figure 1 includes a mobile unit station 2, a UTRAN 4 and a core network 6. The core network 6 links the UTRAN 4 to other similar UTRANs and to the terrestrial telephone network (not shown).

[0015] The core network 6 includes a mobile switching centre (MSC) 8 and a servicing GPRS support node 10 which both serve the UTRAN 4. The UTRAN 4 includes a plurality of RNCs 12 and 14 (only two shown). Each RNC 12, 14 is coupled to a respective node B 16, 18 and each node B 16, 18 is connected to a respective transmitter/receiver 20 and 22 which can communicate with the mobile station 2. The RNCs 12 and 14 are interlinked and communicate with one another when both are in communication with the same mobile phone ie when the mobile phone is located in the overlap between two zones.

[0016] Each RNC 12, as shown in Figure 2, includes

a paging message construction unit 42 having an input 38 connected to the MSC 6 and SGSN 8 and a decision unit 30 which acts to schedule and broadcast the different types of paging messages which it receives from the construction unit 42 in accordance with predetermined criteria pre-programmed into the RNC 12. The RNC 12 also has a buffer unit 33 for storing the paging messages in the selected order. The buffer unit 33 has an output 40 connected to the node B 16. A paging header generating unit 32 generates a header for each paging message which it receives from the construction unit 42 that is to be transmitted via an output terminal 34 to a drift RNC 14 when the drift RNC 14 is used to page the mobile station 2. Components in the drift RNC 14, similar to those in the servicing RNC 12, are similarly referenced but with the suffix A.

[0017] The RNC 14 has a reader unit 36A which when the RNC 14 acts as a drift RNC, receives at an input 43 paging signals from the servicing RNC 12. The RNC 12 has a similar reader unit 36 which receives signals from another servicing RNC when the RNC 12 acts as the drift RNC. The reader unit 36 reads the headers of the paging messages and depending upon the priority information contained in the header, may or may not bypass the decision unit 30 to feed the paging messages directly into the buffer unit 33 in accordance with the schedules selected by the servicing RNC under which it operates.

[0018] It will be appreciated that the structure of each RNC 12 and 14 shown in Figure 2 may be either in hardware form or software form.

Claims

1. A radio network controller (RNC) (12,14) for a third generation (G3) telecommunication network comprising a paging message construction unit (42; 42A) which when the RNC (12,14) acts as a servicing RNC acts to construct or reconstruct paging messages in response to paging signals or data received at a first input (38;38A) from a core network (6), means (30;30A) for scheduling or prioritizing the paging messages received from the construction unit (42;42A) and supplying them to a buffer unit (33;33A) for onward transmission to a first output (40;40A) in the scheduled or prioritised order, characterised by paging header generator means (32; 32A) for supplying a header to the paging messages constructed by the paging message construction unit (42;42A) indicative of the type or priority of the accompanying paging message and feeding it to a second output (34;34A) for onward transmission to a drift RNC, and reading means (36;36A) operative when the RNC (12,14) acts as a drift RNC to respond to signals received at a second input from a servicing RNC to read the headers of the paging messages and to direct the accompanying the pag-

ing message to the buffer unit (33;33A) for onward transmission to the first output in the prioritized or scheduled order.

2. An RNC according to Claim 1, wherein said paging message construction unit (42;42A) is operative to reconstruct a core network initiated paging message.
3. An RNC according to Claim 1 or to Claim 2, wherein said paging message construction unit (42;42A) is operative to construct a signalling related paging message from signalling signals received from the core network (6) and packet related paging messages from packets of data received from the core network (6).
4. A UTRAN including a servicing RNC and a drift RNC, each according to Claim 1 or to Claim 2.

FIG. 1

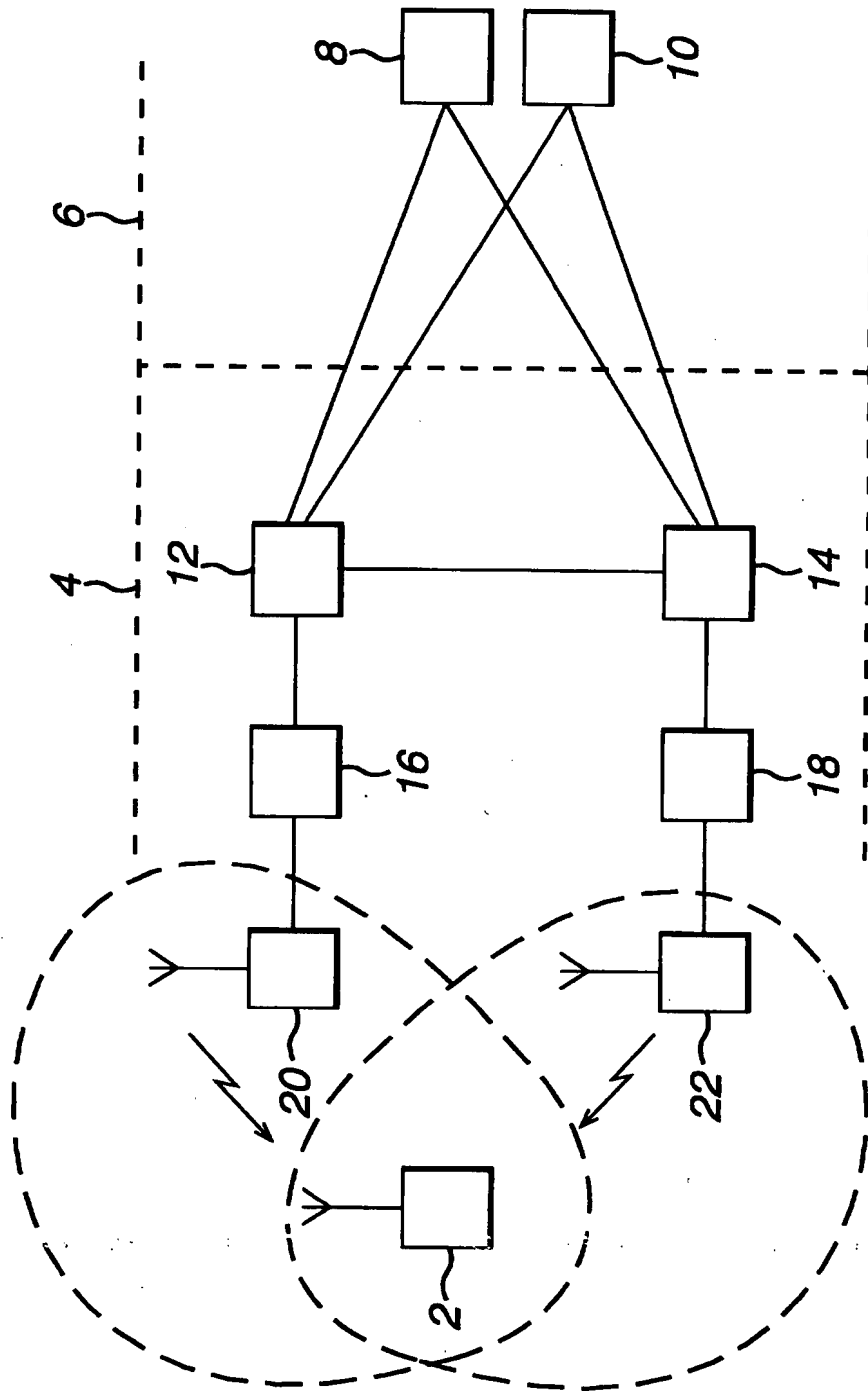
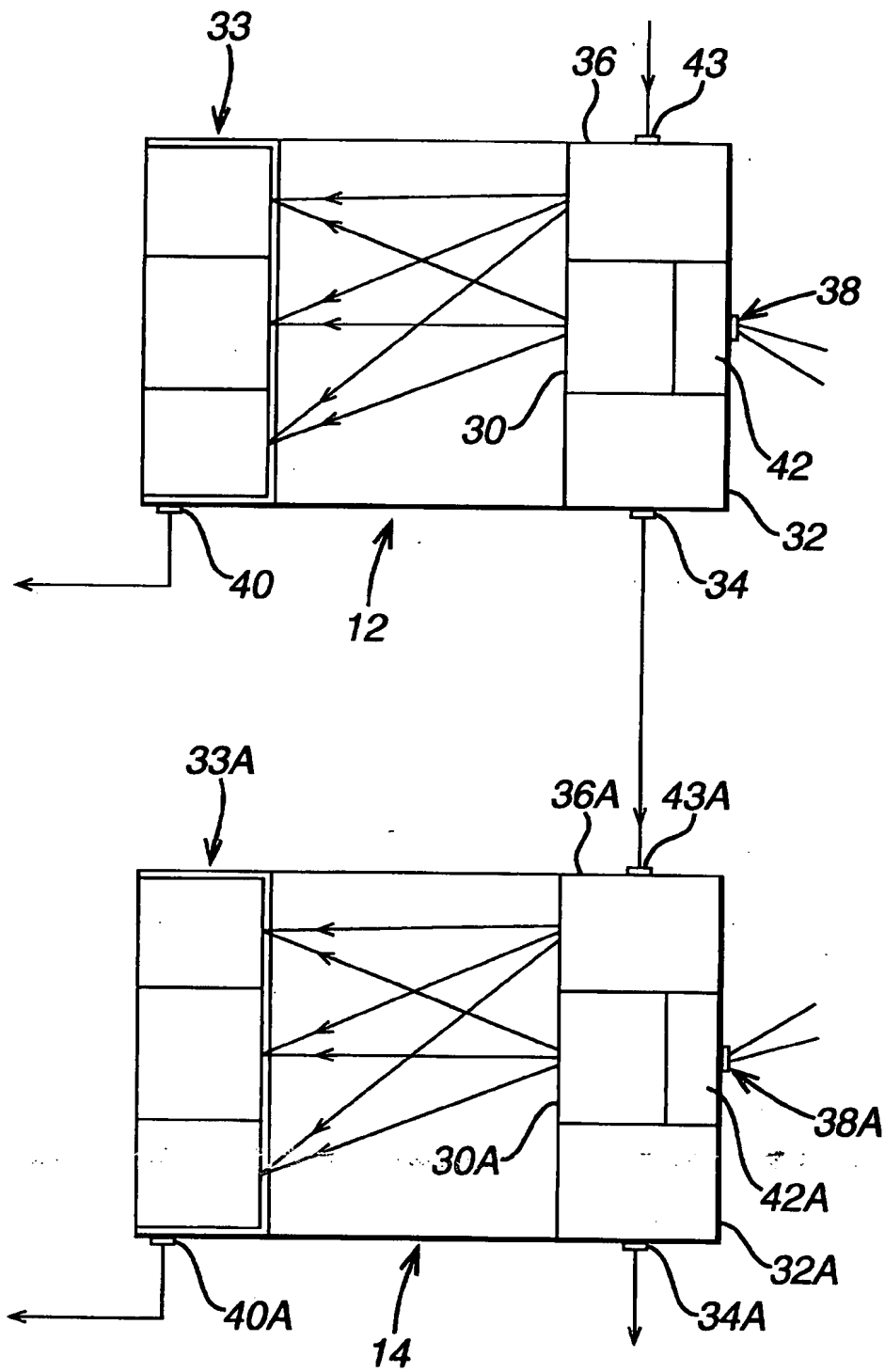


FIG. 2





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EUROPEAN SEARCH REPORT

Application Number
EP 00 31 1663

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	WO 99 57935 A (ERICSSON TELEFON AB L M) 11 November 1999 (1999-11-11) * page 10, line 20 - page 11, line 6 * * page 16, line 26 - page 20, line 29 *	1-4	H04Q7/38 H04Q7/30
A	WO 00 54521 A (NOKIA NETWORKS OY ; LONGONI FABIO (FI); VIALEN JUKKA (FI)) 14 September 2000 (2000-09-14) * page 8, line 1 - page 9, line 13 *	1-4	
A	US 5 533 094 A (SANMUGAM K RAJ) 2 July 1996 (1996-07-02) * column 11, line 47 - column 12, line 65 *	1-4	
E	GB 2 355 623 A (ERICSSON TELEFON AB L M) 25 April 2001 (2001-04-25) * page 3, line 19 - line 29 * * page 8, line 16 - line 26 * * figure 4 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H04Q
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 May 2001	Examiner Baas, G
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons B : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 31 1663

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-05-2001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9957935	A	11-11-1999	AU 4302599 A	23-11-1999
			BR 9910208 A	09-01-2001
			EP 1082869 A	14-03-2001
WO 0054521	A	14-09-2000	FI 990527 A	11-09-2000
			AU 3293900 A	28-09-2000
US 5533094	A	02-07-1996	AU 681079 B	21-08-1997
			AU 4097193 A	13-12-1993
			BR 9305519 A	18-10-1994
			CA 2112972 A	25-11-1993
			CN 1081799 A, B	09-02-1994
			DE 69327032 D	23-12-1999
			DE 69327032 T	24-02-2000
			EP 0596072 A	11-05-1994
			ES 2140457 T	01-03-2000
			FI 940121 A	11-01-1994
			JP 6509220 T	13-10-1994
			MX 9302744 A	01-11-1993
			NZ 252345 A	25-06-1996
			WO 9323964 A	25-11-1993
			SG 44388 A	19-12-1997
GB 2355623	A	25-04-2001	NONE	

EPO FORM P0493

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82